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INTERNATIONAL STANDARD **ISO 12402-4**

Second edition
2020-07

Personal flotation devices —

Part 4: Lifejackets, performance level 100 — Safety requirements

Équipements individuels de flottabilité —

Partie 4: Gilets de sauvetage, niveau de performance 100 — Exigences de sécurité

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 188, *Small craft*, Subcommittee SC 1, *Personal safety equipment*.

This second edition cancels and replaces the first edition (ISO 12402-4:2006), which has been technically revised. It also incorporates the Amendment ISO 12402-4:2006/Amd. 1:2010.

The main changes compared to the previous edition are as follows:

a) new terms and definitions added;

b) level 50 was modified (see 4.2.1);

c) general requirements were modified (see 5.1);

d) requirements for lifting loops were moved to ISO 12402-8:2020;

e) requirement for different types of buoyancy were modified (see 5.3 and Table 2);

f) requirements on strength were added (see 5.5);

g) requirements on performance were modified (see 5.6).

A list of all parts in the ISO 12402 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

ISO 12402 (all parts):2020 deals with personal floatation devices (PFDs) for persons engaged in activities, whether in relation to their work or their leisure, in or near water. PFDs manufactured, selected, and maintained to this International Standard give a reasonable assurance of safety from drowning to a person who is immersed in water. ISO 12402 (all parts):2020 does not include the following:

— requirements for lifejackets on seagoing ships, which are regulated by the International Maritime Organization (IMO)[1)] under the International Convention for the Safety of Life at Sea (SOLAS);

— throwable devices and flotation cushions.

ISO 12402 (all parts):2020 allows for the buoyancy of a PFD to be provided by a variety of materials or designs, some of which can require preparation before entering the water (e.g. inflation of chambers by gas from a cylinder or blown in orally). PFDs can be divided into the following two main classes:

— those which provide face up in-water support to the user regardless of physical conditions (lifejackets), and

— those which require the user to make swimming and other postural movements to position the user with the face out of the water (buoyancy aids).

Within these main two classes there are a number of levels of support, types of buoyancy, activation methods for inflatable devices, and auxiliary items (such as location aids), which all affect the user's probability of survival. Within the different types of buoyancy allowed, inflatable PFDs either provide full buoyancy without any user intervention other than arming (i.e. PFDs inflated by a fully automatic method) or require the user to initiate the inflation. Hybrid PFDs always provide some buoyancy but rely on the same methods as inflatable PFDs to achieve full buoyancy. With inherently buoyant PFDs, the user only needs to put the PFD on to achieve the performance of its class.

PFDs that do not require intervention (automatically operating PFDs) are suited to activities where persons are likely to enter the water unexpectedly; whereas PFDs requiring intervention (e.g. manually inflated PFDs) are only suitable for use if the user believes there will be sufficient time to produce full buoyancy, if automatic operation would result in entrapment, or if help is close at hand. In every circumstance, the user should ensure that the operation of the PFD is suited to the specific application. The conformity of a PFD to this part of the ISO 12402 series:2020 does not imply that it is suitable for all circumstances. The relative amount of required inspection and maintenance is another factor of paramount importance in the choice and application of specific PFDs.

ISO 12402 (all parts):2020 is intended to serve as a guide to manufacturers, purchasers, and users of such safety equipment in ensuring that the equipment provides an effective standard of performance in use. Equally essential is the need for the designer to encourage the wearing of the equipment by making it comfortable and attractive for continuous wear on or near water, rather than for it to be stored in a locker for emergency use. The primary function of a PFD is to support the user in reasonable safety in the water. Within the two classes, alternative attributes make some PFDs better suited to some circumstances than others or make them easier to use and care for than others. Important alternatives provided by ISO 12402 (all parts):2020 are the following:

— to provide higher levels of support (levels 100, 150, or 275) that generally float the user with greater water clearance, when required for increasingly severe conditions; or to provide lighter or less bulky PFDs (levels 50 or 100);

— to provide the kinds of flotation (inherently buoyant foam, hybrid, and inflatable) that accommodate the sometimes conflicting needs of reliability and durability, in-water performance, and continuous wear;

1) The International Maritime Organization (IMO) is an institution with domicile in London issuing regulations which are then published as laws by its Member States.

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— to provide automatically operating (inherently buoyant or automatically inflated) PFDs that float users without any intervention on their part, except in initially donning the PFD (and regular inspection and rearming of inflatable types), or to provide user control of the inflatable PFDs buoyancy by manual and oral operation; and

— to assist in detection (location aids) and recovery of the user.

PFDs provide various degrees of buoyancy in garments that are light in weight and only as bulky and restrictive as needed for their intended use. They need to be secure when worn, in order to provide positive support in the water and to allow users to swim or actively assist themselves or others. The PFD selected ensures that the user is supported with the mouth and nose clear of the water under the expected conditions of use and the user's ability to assist.

Under certain conditions (such as rough water and waves), the use of watertight and multilayer clothing which provide (intentionally or otherwise) additional buoyancy or the use of equipment with additional weight (such as tool belts) can alter the performance of the PFD. Users, owners and employers need to ensure that this is taken into account when selecting a PFD. Similarly, it is possible that PFDs do not perform as well in extremes of temperature, although meeting ISO 12402 (all parts):2020 requirements. PFDs can also be affected by other conditions of use, such as chemical exposure and welding, and can require additional protection to meet the specific requirements of use. Taking a PFD into such conditions necessitates the assurance that the PFD will not be adversely affected. ISO 12402 (all parts):2020 also allows a PFD to be an integral part of a safety harness designed to conform to ISO 12401:2009, or an integral part of a garment with other uses, for example to provide thermal protection during immersion, in which case the complete assembly as used is expected to conform to ISO 12402 (all parts):2020.

In compiling the attributes required of a PFD, consideration has also been given to the potential length of service that the user might expect. Whilst a PFD needs to be of substantial construction and material, its potential length of service often depends on the conditions of use and storage, which are the responsibility of the owner, user and/or employer. Furthermore, whilst the performance tests included are believed to assess relevant aspects of performance in real-life use, they do not accurately simulate all conditions of use. For example, the fact that a device passes the self-righting tests in swimming attire, as described herein, does not guarantee that it will self-right an unconscious user wearing clothing; neither can it be expected to completely protect the airway of an unconscious person in rough water. Waterproof clothing can trap air and further impair the self-righting action of a lifejacket.

It is essential that owners, users and employers choose those PFDs that meet the correct standards for the circumstances in which they will be used.

The characteristics of the product properties, alternative choices and the limitations to normal use are to be explained to potential buyers by manufacturers and distributors of PFDs prior to purchase.

Similarly, it is advised that regulators regarding the use of these garments consider carefully which class and performance levels are most appropriate for the foreseeable conditions of use, allowing for the higher risk circumstances. These higher risk circumstances should account for the highest probabilities of occurrence of accidental immersion and expected consequences. Requirements and recommendations for the correct selection and application of PFDs are given in ISO 12402-10:2020.

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Personal flotation devices —

Part 4:
Lifejackets, performance level 100 — Safety requirements

1 Scope

This document specifies the safety requirements for lifejackets, performance level 100. It is applicable to lifejackets used by adults, children and infants, for use in sheltered or calm water, or when the users are fully clothed.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 12402-5:2020, *Personal flotation devices — Part 5: Buoyancy aids (level 50) — Safety requirements*

ISO 12402-6:2020, *Personal flotation devices — Part 6: Special application lifejackets and buoyancy aids — Safety requirements and additional test methods*

ISO 12402-7:2020, *Personal flotation devices — Part 7: Materials and components — Safety requirements and test methods*

ISO 12402-8:2020, *Personal flotation devices — Part 8: Accessories — Safety requirements and test methods*

ISO 12402-9:2020, *Personal flotation devices — Part 9: Evaluation*

ISO 13688:2013, *Protective clothing — General requirements*

IMO Resolution A.658 (16), *Use and fitting of retro-reflective materials on life-saving appliances*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
personal flotation device
PFD
garment or device which, when correctly worn and used in water, provides the user with a specific amount of buoyancy which increases the likelihood of survival

3.2
inherently buoyant
permanently less dense than water

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3.3
automatically inflated PFD
PFD (3.1) in which inflation is effected as a result of immersion without the user carrying out any action at the time of immersion

3.4
manually inflated PFD
PFD (3.1) in which inflation is effected as a result of the user operating a mechanism

3.5
oral inflation
inflation resulting from the user blowing air into the *PFD* (3.1) by mouth

3.6
emergency position-indicating light
device which emits light so as to increase the chances of a user being located

3.7
multi-chamber buoyancy system
PFD (3.1) with buoyancy to meet the applicable PFD performance requirement provided by two or more independent chambers

Note 1 to entry: This excludes supplemental inflation chambers.

3.8
deck safety harness
device that allows a user to be securely attached to a strong point on a vessel or on shore, preventing a fall into the water or, if falling occurs, preventing separation from the vessel or shore

3.9
buddy line
length of cord which can be tied or otherwise fixed to another person or to that person's *PFD* (3.1) or other objects, so as to keep a user in the vicinity of that person or object with a view to making location and thus rescue easier

3.10
lifting loop
device which facilitates manual recovery of a person from water

3.11
sprayhood
cover brought or placed in front of the airways of a user in order to reduce or eliminate the splashing of water from waves or the like onto the airways, and thereby promoting the survival of the user in rough water conditions

3.12
protective cover
cover that is normally in place over the functional elements of a *PFD* (3.1) in order to protect them from physical damage, or snagging on external objects

Note 1 to entry: The protective cover may be designed to provide additional properties, i.e. to make the PFDs suitable for use when the subject is exposed to additional hazards, e.g. significant abrasion, molten metal splash, flame and fire.

Note 2 to entry: The inflatable chamber of an inflatable PFD is an example of a functional element.

3.13
overpressure relief valve
valve which may be used in an inflatable system to avoid the likelihood of destruction caused by overpressure

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3.14
whistle
device which, when blown by mouth, produces an audible sound which can aid in the location of the user

3.15
hybrid PFD
PFD (3.1) of combined buoyancy types, i.e. inherent and inflatable

3.16
bunching
curling or folding of internal buoyant material upon itself, from its original position, within the envelope

3.17
sheltered waters
water with protection from significant breaking waves, current, or strong winds, where the possibility of being blown or carried away from shore or place of safety is minimal

3.18
offshore
water that is unprotected and influenced by a variety of threat conditions such as waves, tide, currents, or wind, at sea or on inland waters

3.19
primary means of inflation
means of inflating an inflation chamber that meets the applicable PFD performance requirements and that requires the least amount of intervention by the user, generally according to the following order of precedence: automatic (easiest), manual (second), and oral (most difficult)

3.20
secondary means of inflation
alternate method of inflation which is provided in case the *primary means of inflation* (3.19) fails

3.21
primary chamber
inflation chamber associated with the *primary means of inflation* (3.19) that alone meets the applicable *PFD* (3.1) performance requirements

3.22
back-up chamber
inflation chamber other than the *primary chamber(s)* (3.21) or *supplemental chamber* (3.23) that, when used alone, provides performance in case the primary chamber fails to function

3.23
supplemental chamber
inflation chamber other than a *primary chamber* (3.21) or *back-up chamber* (3.22) that is intended for deployment after stabilization in the water, and provides enhanced performance such as higher freeboard, improved head support, additional stability, splash protection, location, detection

3.24
status indicator
part or parts of an inflation system which provide user feedback to assist in keeping an inflatable PFD in an armed and ready condition

3.25
adult lifejacket
PFD (3.1) intended for users with a body mass greater than 40 kg

3.26
infant lifejacket
lifejacket intended for users with a body mass less than or equal to 15 kg

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3.27
child lifejacket
lifejacket intended for users with a body mass greater than 15 kg and less than or equal to 40 kg

3.28
structural parts, materials and components
parts, materials, or components that are integral to the device and that are essential for its correct function and performance

3.29
ride-up prevention system
system that helps to secure the *PFD* (3.1) in its functional position on the body and prevent the PFD from riding up the body towards the head

Note 1 to entry: A crotch strap is one example of a ride-up prevention system.

3.30
collar handle
device on the upper back of a *PFD* (3.1) which facilitates getting hold of the wearer

3.31
personal locator device
PLD
device that aids the (electronic) detection and location of people in distress and emergency situations

4 Classification of PFDs

4.1 Classes

4.1.1 Buoyancy aids

A buoyancy aid is a garment or device that, when worn correctly, provides support without significant face-up turning ability and therefore can require an action by the user to position the face clear of the water.

A buoyancy aid provides suitable performance in sheltered waters, and at higher levels of support, it can be suitable for use in other waters.

4.1.2 Lifejackets

A lifejacket is a garment or device that, when worn correctly, maintains the user in a face-up flotation position, without additional action, with various levels of performance suitable for sheltered and unsheltered waters.

A lifejacket has a buoyancy distribution sufficient to turn most users to a position where the mouth is clear of the water even when exhausted.

4.1.3 Special application PFDs

A special application PFD shall have performance equivalent to a lifejacket or buoyancy aid, but has additional features and requirements related to specific applications for use. These PFDs can require additional action by the user, or can only be suitable for certain activities or user groups according to ISO 12402-6:2020.

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4.2 Performance levels

4.2.1 Level 50

This level is intended for use by those who have help or a means of rescue close at hand, and who are able to swim. This device often has minimal bulk, but requires active participation by the user and cannot be expected to keep the user safe for a long period of time.

As tested in swimming attire (when fully inflated, if inflatable) the device helps to support the user in a position with the mouth and nose clear of the water. It can support a fully clothed user in this position.

4.2.2 Level 100

This level is intended for use in sheltered or calm water, where users may have to wait for rescue.

As tested in swimming attire (when fully inflated, if inflatable) the device has some turning ability to bring the user into a position with the mouth and nose clear of the water. It is intended to maintain a fully clothed user in this position without active participation.

4.2.3 Level 150

This level is intended for general, offshore, and rough water use.

As tested in swimming attire (when fully inflated, if inflatable) the device is capable of turning an unconscious user into a position with the mouth and nose clear of the water. It is intended to maintain a fully clothed user in this position without active participation.

4.2.4 Level 275

This level is intended primarily for offshore use under severe weather or sea conditions. It is of value to those who are wearing clothing which traps air and adversely affects the self-righting capacity of the lifejacket. It is also intended for a user who requires a high level of buoyancy, for example when carrying heavy objects.

As tested in swimming attire (when fully inflated, if inflatable), it is capable of turning an unconscious user into a position with the mouth and nose clear of the water. It is intended to maintain a fully clothed user in this position without active participation.

5 Requirements

5.1 General

A lifejacket, performance level 100, shall meet the requirements specified in this clause when tested in accordance with ISO 12402-9:2020.

It shall meet the requirements of ISO 13688:2013, 4.2 (innocuousness), and 4.4 (comfort).

There shall be no damage impairing the performance of the PFD when tested in accordance with ISO 12402-9:2020, 5.5.2. In addition, for an inflatable device, any status indicators shall maintain a positive indication and the gas cylinder shall not become loosened or dislodged.

The interface between the gas cylinder and the inflation system as well as the interface between the inflation system and the lifejacket shall remain secure during use, such that none of the mentioned components can come loose. The lifejacket shall remain functional.

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5.1.1 Materials and components

Structural parts, materials and components used for the construction of a lifejacket, performance level 100, shall be tested in accordance with ISO 12402-7:2020 and comply with ISO 12402-7:2020, Clause 4. The structural materials and components shall comply as specified in 5.1.1.1 to 5.1.1.12.

5.1.1.1 Sewing thread

Shall be tested in accordance with and comply with ISO 12402-7:2020, 4.2.

5.1.1.2 Fabric

Shall be tested in accordance with and comply with ISO 12402-7:2020, 4.3.

5.1.1.3 Structural webbing and tie tapes

Shall be tested in accordance with and comply with ISO 12402-7:2020, 4.4.

5.1.1.4 Structural lacing

Shall be tested in accordance with and comply with ISO 12402-7:2020, 4.5.

5.1.1.5 Structural zippers

Shall be tested in accordance with and comply with ISO 12402-7:2020, 4.6.

5.1.1.6 Hardware

Shall be tested in accordance with and comply with ISO 12402-7:2020, 4.7.

5.1.1.7 Foam flotation material

Shall be tested in accordance with and comply with ISO 12402-7:2020, 4.8.

5.1.1.8 Inflation chamber materials

Shall be tested in accordance with and comply with ISO 12402-7:2020, 4.9.

5.1.1.9 Polymeric foam coatings

Shall be tested in accordance with and comply with ISO 12402-7:2020, 4.10.

5.1.1.10 Inflation systems for hybrid and solely inflatable lifejackets

Shall be tested in accordance with and comply with ISO 12402-7:2020, 4.11.

5.1.1.11 Gas-filled cylinders

Shall be tested in accordance with and comply with ISO 12402-7:2020, 4.12.

5.1.1.12 Non-structural parts

Non-structural parts, materials and components shall not hinder compliance with the standard.

5.1.2 Means of inflation

Inflatable lifejackets shall have automatic inflation as their primary means of inflation, except for manual-only inflatable PFDs as specified in ISO 12402-6:2020, 6.3. They shall also have manual

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secondary means of inflation and each chamber shall have at least oral means of inflation. If the inflation systems are located on separate inflation chambers, see 5.7.

5.1.3 Body strap and lacing ends requirements

The free end of any body strap and lacing necessary for the performance of the PFD shall be provided with a means, such that the strap (lacing) does not disengage from the hardware when tested in accordance with ISO 12402-9:2020, 5.5.8. Duplicate combinations of hardware-webbing constructions that prevent hardware separation from the PFD need not be retested.

5.1.4 Inflation status indicators

Inflatable lifejackets shall indicate if the inflator is correctly armed with a sealed cylinder and fully operable except as specified in ISO 12402-6:2020, 6.6. All inflation status indicators shall be grouped or located such that when installed on a PFD in their intended position, they are viewed simultaneously when examined prior to donning and shall be in a position where they can be checked by the wearer and/or a buddy after donning the PFD.

5.1.5 Ride-up prevention system

A lifejacket designed for persons with a body mass of less than or equal to 30 kg shall be provided with a ride-up prevention system.

It is recommended that a lifejacket designed for persons with a body mass of greater than or equal 30 kg may be also provided with a ride-up prevention system as an optional requirement.

5.1.6 Rearming and repacking information

The rearming and repacking information supplied with the PFD as defined in Clause 7, h) and i) shall be assessed to be useable by untrained users when rearming and repacking the PFD. The information supplied to support rearming and repacking shall include all media supplied by the manufacturer.

5.1.7 Oral inflation

An inflatable PFD shall permit the user to orally inflate by mouth while in or out of the water using either hand independently, when tested according to ISO 12402-9:2020, 5.6.8.

5.1.8 Magnetic properties

No metallic component shall affect a magnetic compass of a type commonly used in small boats by more than 1° when the PFD including all of its accessories and components is placed 500 mm from the compass, when tested according to ISO 12402-9:2020, 5.4.

5.2 Combination of lifejackets and accessories

Accessories used on lifejackets, performance level 100 shall comply with ISO 12402-8:2020 as specified in Table 1 of this document.

Combinations of a lifejacket and accessories shall not impair the performance of either item. This shall be proved by testing the lifejacket and accessories in combination. If necessary, the test sequence has to be arranged accordingly. Requirements and test methods for accessories are specified in ISO 12402-8:2020.

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Table 1 — Accessories

Accessory	Mandatory (M)/ Optional (O)	Subclause in this document	Subclause in ISO 12402-8:2020
Emergency position-indicating light	O	—	5.10
Whistle	M	—	5.2
Lifting loop	O	—	5.9
Collar handle	O	5.5	—
Buddy line	O	—	5.4
Retroreflective material	M	5.4.2	—
Deck safety harness	O	—	5.3
Overpressure relief valve	O	5.3.2	—
Multi-chamber buoyancy system	O	—	5.7, 5.8
Protective cover	O	—	5.6
Sprayhood	O	—	5.5
Ride-up prevention system (for persons with a body mass > 30 kg)	O	5.5, 5.6.1.5 - 5.6.2.5	—
Ride-up prevention system (for persons with a body mass ≤ 30 kg)	M	5.1.5, 5.5 5.6.1.5 – 5.6.2.5	—
Personal locator device	O	—	5.11

5.3 Types of buoyancy

5.3.1 General

5.3.1.1 The amount of buoyancy and its distribution shall be such that the in-water performance required (freeboard, turning capacity, stable floating position, etc.) is met.

The minimum amount of buoyancy for a lifejacket as specified in Table 2 can be provided by inherently buoyant material, chambers inflated by gas or by a combination of the two.

5.3.1.2 If the lifejacket is of a hybrid type, it shall provide, by its inherent buoyancy alone the performance requirements of ISO 12402-6:2020, 6.5 as a minimum.

5.3.1.3 An inflatable lifejacket shall float for at least 5 min when tested in accordance with ISO 12402-9:2020, 5.5.11.

5.3.2 Inflatable buoyancy chambers

5.3.2.1 Inflatable buoyancy chambers, components and relief valves shall be capable of withstanding an overpressure without damage or permanent deformation or evidence of leakage when tested in accordance with ISO 12402-9:2020, 5.5.14.

If a device is operated with an overpressure relief valve, it shall be tested in accordance with ISO 12402-9:2020, 5.5.14.

5.3.2.2 Gas-inflated lifejackets shall withstand the inflation test in accordance with ISO 12402-9:2020, 5.5.9, before the buoyancy test in accordance with ISO 12402-9:2020, 5.5.10, is performed. Both automatic

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and manual inflation modes shall be tested. A lifejacket shall attain the minimum buoyancy required by Table 2 within the stated time limits below. The lifejacket shall also achieve its intended shape.

For automatic inflation mode, the time required from the immersion of the inflator until initiation of inflation shall not exceed 5 s when tested according to ISO 12402-9:2020, 5.5.9, and from initiation of inflation to when the minimum buoyancy is obtained shall not exceed another 5 s.

For manual inflation mode, the time required from the manual activation of the device to when the assembly begins to rise to the surface shall not exceed 5 s when tested according to ISO 12402-9:2020, 5.5.9.

5.3.2.3 For inflatable lifejackets, the inflation mechanism shall not activate below 13 N and shall activate between 13 N and 120 N when tested in accordance with ISO 12402-9:2020, 5.5.9.

5.3.3 Inherently buoyant material

5.3.3.1 Any inherently buoyant material used to provide buoyancy shall be capable of withstanding compression and movement in normal wear without sustaining permanent loss of buoyancy.

5.3.3.2 Any inherently buoyant material shall prove to have properties in accordance with ISO 12402-7:2020, 4.8.

5.3.4 Total buoyancy provided

5.3.4.1 For the purpose of assessment in accordance with this document, items of different size are to be accompanied by stated minimum and maximum user's mass, which shall conform to the marked size ranges.

The primary means of indicating the device's size as regards fit shall be one which is appropriate and meaningful to the prospective user, for instance the statement of mass and girth ranges.

5.3.4.2 When tested in accordance with ISO 12402-9:2020, 5.5.10, the minimum buoyancy provided by the different levels shall be as specified in Table 2.

Table 2 — Minimum buoyancy as a function of the user's mass

Parameter	User						
	Infant lifejacket	Child lifejacket		Adult lifejacket			
User's mass, m (kg)	$m \leq 15$	$15 < m \leq 30$	$30 < m \leq 40$	$40 < m \leq 50$	$50 < m \leq 60$	$60 < m \leq 70$	$m > 70$
Minimum buoyancy, F (N)	30	40	50	60	70	80	100

5.3.4.3 If the lifejacket is intended for two or more mass categories, the buoyancy shall be at least as specified for the heavier category.

5.3.4.4 The buoyancy of the lifejacket shall be tested in accordance with ISO 12402-9:2020, 5.5.10. When comparing the initial measurements with the measurement after 24 h, the loss of buoyancy shall not exceed 5 %.

The buoyancy, measured in any test carried out for the purpose of ascertaining conformity to this document shall not be less than that claimed on the marking of the lifejacket, or less than that required in 5.3.4.2.

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5.4 Conspicuousness

5.4.1 Colour

The colour of the exposed portions (excluding components such as webbing, zippers and other fittings) of the lifejacket when deployed in the normal floating position shall be in accordance with ISO 12402-7:2020, 4.3.3.

For search and rescue, yellow-orange and red-orange shall be favoured, preferably fluorescent colours which are superior in detectability.

5.4.2 Retroreflective material

At least 100 cm^2 of retroreflective material conforming to the specifications in IMO Resolution A.658 (16), Annex 2 shall be affixed to the surface of the lifejacket.

When supporting the user at rest in the water, the retroreflective material shall be visible from all sides and above the lifejacket. A minimum of 100 cm^2 of material shall be visible above water level.

In case of a reversible lifejacket, the minimum area and arrangement shall be complied with, no matter which way the device is donned.

5.5 Strength

The vertical and horizontal strength of the device shall be tested in accordance with ISO 12402-9:2020, 5.5.4. No damage shall occur impairing the function of the lifejacket as specified in this document. The means of adjustment shall not have a slippage exceeding 25 mm when subjected to the test.

The horizontal load shall be no less than 2 000 N for adult lifejackets and child lifejackets, and 1 000 N for infant lifejackets when tested in accordance with ISO 12402-9:2020, 5.5.4.3.2. The vertical load shall be no less than 750 N for adult lifejackets and child lifejackets, and 500 N for infant lifejackets when tested in accordance with ISO 12402-9:2020, 5.5.4.3.3. The load shall be maintained for 30 min.

The horizontal load value shall also apply for the lifting loop tested according to ISO 12402-9:2020, 5.5.5. The load shall be maintained for 30 min.

Where a ride-up prevention system is supplied as part of a device the strength tests shall be conducted both with and without the ride-up prevention system correctly fitted. If provided, the test panel shall verify that each hardware-webbing-end tab combination shall remain firmly engaged and usable when subjected to normal handling.

The vertical load value shall apply for the collar handle load test when tested in accordance with ISO 12402-9:2020, 5.5.7. The load shall be maintained for (5 ± 0,1) min.

All attachment points on inherently buoyant PFDs, attachment points on the chambers of an inflatable PFD and joints and couplings within attached inflation system components shall be tested in accordance with ISO 12402-9:2020, 5.5.15. For each attachment to an inflatable chamber, a load of (220 ± 10) N shall be supported without impairing the performance of the PFD or its component parts. For inherently buoyant and inflatable PFDs having other identifiable attachments, a load of (150 ± 10) N shall be supported without causing loss of function of the PFD or its component parts.

After the test, the PFD shall be visually inspected and for inflatable PFDs, the PFD shall be inflated and there shall be no leakage.

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5.6 Performance

5.6.1 General

5.6.1.1 When worn, the lifejacket shall not be unduly bulky, heavy or uncomfortable when tested in accordance with ISO 12402-9:2020, 5.6.

5.6.1.2 Buoyant materials shall not display bunching when tested in accordance with ISO 12402-9:2020, 5.6.3 and 5.6.4.

5.6.1.3 When worn, the lifejacket shall allow tightening and loosening of essential adjustments both ashore and in the water, if necessary, to ensure that the device does not unduly restrict the vision, hearing, breathing or movement of the user when tested in accordance with ISO 12402-9:2020, 5.6.1.7.

The lifejacket shall not interfere with vision when worn both ashore and in the water and shall allow sufficient comfort, and head and limb movement to preclude it from being removed because of encumbrance or discomfort during emergency use both ashore and in the water.

5.6.1.4 The lifejacket shall not contain any component nor use any method of component attachment which in normal use is likely to cause injury to the user or damage the lifejacket.

5.6.1.5 The lifejacket shall not hinder the user from performing necessary tasks. The user shall be able to swim whilst using the lifejacket, climb a ladder, and board a SOLAS liferaft or rigid platform when tested in accordance with ISO 12402-9:2020. At least two-thirds of subjects who can accomplish the task specified in ISO 12402-9:2020, 5.6.7, without the lifejacket, shall also be able to perform it with the lifejacket.

5.6.1.6 There shall be no damage, such as shrinking, cracking, swelling, dissolution or change of mechanical properties, which impairs the performance or donning characteristics of the lifejacket when tested in accordance with ISO 12402-9:2020, 5.5.3. If the manufacturer provides additional storage conditions, those conditions shall be taken into account in addition, to the temperature cycling test in accordance with ISO 12402-9:2020, 5.5.3.

5.6.1.7 The lifejacket shall not form channels having a tendency to direct water into the face or to the head of the user. The test panel shall witness this by visual inspection during the in-water performance tests according to ISO 12402-9:2020, 5.6.

5.6.1.8 Automatic inflatable lifejackets shall not inflate inadvertently when tested in accordance with ISO 12402-9:2020, 5.5.16.

5.6.1.9 When tested in accordance with ISO 12402-9:2020, 5.5.13, the lifejacket shall not continue to burn 6 s after removal from the flame, and shall retain at least the minimum required buoyancy.

5.6.1.10 Lifejackets designed for persons of less than 30 kg shall be provided with a ride-up prevention system.

Lifejackets designed for persons with a body mass of greater than or equal to 30 kg may be provided with a ride-up prevention system as an optional requirement.

If a ride up prevention system is supplied on a lifejacket, the in-water performance tests shall be performed in accordance with ISO 12402-9:2020, 5.6, both with and without the ride up prevention system in place.

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The tests shall be performed with the ride-up prevention system in place, when either one of the following applies:

a) When the manufacturer declares that the ride-up prevention system is essential to meet the in-water performance requirements, as declared in the user information,

b) Where the device cannot be donned without the ride-up prevention system correctly fitted.

5.6.1.11 There shall be no damage impairing the performance of the lifejacket when tested in accordance with ISO 12402-9:2020, 5.5.2. In addition, for an inflatable device, the status indicators shall maintain a positive indication. Neither the gas cylinder nor the inflation system shall become loose or dislodged.

5.6.2 Donning, adjustment and fit

5.6.2.1 The lifejacket shall have a proper fit and adjustment. It shall be easy to don. Ties and fastenings necessary for proper performance should be few and simple.

5.6.2.2 Donning shall be obvious and simple with the briefest of instructions as provided by the manufacturer. Donning shall be possible without assistance, except for child and infant lifejackets, for which adult assistance is permitted in accordance with ISO 12402-9:2020, 5.6.2.2.

When tested in accordance with ISO 12402-9:2020, 5.6, donning by all means of securing the lifejacket required to meet the in-water performance requirements shall take no longer than 1 min. The inflated donning shall take no longer than 2 min.

5.6.2.3 When tested in accordance with ISO 12402-9:2020, 5.6, the means of adjustment within the stated size range shall ensure a secure fit. Security of fit shall not be dependent upon highly elastic material.

5.6.2.4 Each subject shall make one additional donning attempt using heavy weather clothing as defined in ISO 12402-9:2020, 5.6.2.

5.6.2.5 Each mode of inflation shall be tested both in and out of the water in accordance with ISO 12402-9:2020, 5.6, as applicable.

5.6.3 In-water performance

5.6.3.1 A lifejacket shall provide lateral and occipital support of the user's head so that the mouth of a relaxed individual is held clear of a still water surface with the trunk of the body inclined backwards from the vertical when tested in accordance with ISO 12402-9:2020, 5.6.3 and 5.6.4. The average of all subjects' trunk angles shall be at least 30° from vertical provided that no individual subject's angle is less than 20° from vertical, when tested in accordance with ISO 12402-9:2020, 5.6.3 and 5.6.4. All subject's face plane (head) angles shall be positive (>0° and not more than 90° from the horizontal) when tested in accordance with ISO 12402-9:2020, 5.6.4. Lifejackets for children and infants shall be tested in accordance with ISO 12402-9:2020, 5.6.3.

A manikin may be used as a supplementary tool, when testing lifejackets for children or infants, in which case the test procedure according to ISO 12402-9:2020, 5.7, shall be followed.

The lifejacket shall bring the manikin to the surface within 5 s of impact. The manikin shall then float in a face-up posture with the mouth clear of the water. There shall be no damage impairing the performance of the lifejacket.

5.6.3.2 The freeboard measured in accordance with ISO 12402-9:2020, 5.6.5, shall be no less than 80 mm for each adult test subject and not less than 50 mm for each infant and child test subject without the

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repositioning of any part of the body. When testing with a manikin in accordance with ISO 12402-9:2020, 5.7.4.2, following the drop tests, two out of the three freeboard measurements shall be not less than 50 mm.

5.6.3.3 When floating in an attitude of relaxed static balance, each human test subject's respiration shall not be impeded, when tested in accordance with ISO 12402-9:2020, 5.6.

5.6.3.4 When the lifejacket is in an operational condition, it shall turn the test subject to the position required by 5.6.3.1 within 10 s when tested in accordance with ISO 12402-9:2020, 5.6.4.

5.6.3.5 The user shall have the possibility to maintain a stable position and not turn face down, when tested in accordance with ISO 12402-9:2020, 5.6.6.

5.6.3.6 When tested in accordance with ISO 12402-9:2020, 5.6.3, the lifejacket shall not become dislodged, cause harm to the test subject or be damaged so as to affect its in-water performance or buoyancy.

5.6.3.7 The user shall not slip out of the lifejacket when tested in accordance with ISO 12402-9:2020, 5.6.

5.6.3.8 The lifejacket shall not ride up to such an extent as to impair its performance, meeting the requirements given in this part of the ISO 12402 series:2020 when tested in accordance with ISO 12402-9:2020, 5.6.

5.6.3.9 With each test subject in the water, the PFD shall permit oral inflation sufficient to provide the test subject with positive freeboard within 45 s for any PFD up to 150 N buoyancy. For PFDs over 150 N buoyancy, an additional 15 s is allowed for each additional 50 N buoyancy.

5.7 Multi-chamber buoyancy systems

5.7.1 For multi-chamber buoyancy systems where the minimum performance required is provided by the aggregate buoyancy of multiple primary chambers, each required chamber shall have independent primary automatic inflation, and the total system shall meet all the performance requirements of this part of the ISO 12402 series:2020 without exception.

5.7.2 Multi-chamber buoyancy systems that provide back-up or supplemental flotation shall be in accordance with ISO 12402-8:2020, 5.7 or 5.8, as applicable. If provided, a full back-up chamber or combination of full back-up chambers shall, when tested according to ISO 12402-8:2020, 5.7, and ISO 12402-9:2020, 5.6, provide at least in-water performance conforming to this part of the ISO 12402 series:2020. If provided, partial back-up chamber or combination of partial back-up chambers shall, when tested according to ISO 12402-8:2020, 5.7, and ISO 12402-9:2020, 5.6, provide at least in-water performance conforming to ISO 12402-5:2020.

If provided with a supplemental chamber(s) the PFD shall meet the in-water performance requirements of this document with and without the supplemental chamber(s) inflated when tested in accordance with ISO 12402-8:2020, 5.8 and ISO 12402-9:2020, 5.6.

6 Marking

6.1 General

The lifejacket shall be permanently and legibly marked with the information given in 6.2, which shall be given at least in the official language(s) of the country of destination. Information shall be given preferably as pictograms, or as text combined with pictograms, or, if defined pictograms do not exist, as text alone.

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6.2 Information on the lifejacket

Information on the lifejacket shall include the following items:

a) identification of the manufacturer — at least the name of the manufacturer or representative and their mailing address;

b) the class of the PFD according to 4.1 and the performance level according to 4.2;

c) the statement that it is not a lifejacket until fully inflated (only on an inflatable lifejacket);

d) the size range of the lifejacket, e.g. range of chest girth and user's body mass;

e) the minimum buoyancy provided and amount of inflatable buoyancy, if a hybrid type;

f) storage, care, cleaning and maintenance instructions in brief;

g) simple donning and adjustment instructions;

h) a warning that states: "Check before each use according to manufacturer's instructions" or the pictogram according to Figure 1;

Figure 1 — Pictogram (ISO 7000-1641)

i) simple instructions for use;

j) if inflated by gas, the correct filled gas mass of the cylinder (in g). This information shall appear near the place where the cylinder is actually fitted;

k) if inflated by gas, a warning that gas cylinders are dangerous goods, and that they shall be kept away from children and not misused;

l) the manufacturer's model, designation, serial or lot number, and quarter (or month) and year of manufacture;

NOTE Months are given as Arabic numerals (1 to 12), and quarters as Roman numerals (I to IV) in order, starting from 1st January.

m) the number of this part of ISO, i.e. of ISO 12402-4:2020;

n) pictograms or words indicating other risks catered for or not provided for;

o) the text "Do not use as a cushion";

p) the text "Train yourself in the use of the device";

q) the text "Teach the child to float in this lifejacket", if intended for children;

r) the text "For children less than 6 years of age, use automatically operating devices only", if intended for children;

s) the range of its specific application;

t) the expected servicing interval assuming average use, and a space for servicing dates to be marked, including additional items (gas bottles, bobbins, retroreflective tapes, etc.) and their replacement;

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u) compatibility with the intended safety harnesses, clothing or additional equipment as relevant, specific equipment to be listed;

v) the text "Full performance may not be achieved using waterproof clothing or in other circumstances. Refer to the leaflet";

w) for PFDs for users with a body mass up to 15 kg the text "WARNING: Do not apply diapers which provide buoyancy when using the lifejacket."

The label bearing this information shall be permanently affixed to the lifejacket shall be resistant to salt water and stand at least 10 washes carried out in accordance with the manufacturer's instructions. The label shall not shrink more than 10 % after washing.

Special 'lace up' pictograms showing the manufacturer's exact recommendations for webbing (narrow fabric) lacing through the buckle and fastening combination of the 'cow-tail' and the text "Practice and training are required with this device before use" shall be placed on the lifejacket and in the accompanying information.

7 Information supplied by the manufacturer

The lifejacket shall be supplied with an explanatory leaflet containing at least the following items:

a) items given in 6.2;

b) the recommendation that the user should try out the lifejacket to ascertain its performance before use;

c) full instructions for donning and use (also instructions for whistle and light if fitted);

d) details of the recommended limitations on use, including sea conditions, temperature limits, life span and any other pertinent information;

e) a description of any spare parts and their replacement, instructions for servicing, maintenance, and packing, if applicable;

f) instructions about security of fit and the need to check and tighten the adjustments in the event of water entry;

g) such other general advice on the care and use of the lifejacket as the manufacturer sees fit;

h) instructions for the user on how to check the lifejacket before each use;

i) end user information to allow the user to rearm and repack;

j) contact details for advice on rearming, repacking and servicing of the lifejacket;

k) an additional warning about use in colder temperatures and the effect on the performance of the PFD;

NOTE 1 Item k) only on an inflatable PFD.

l) the warning statement: "WARNING: In cold environments inflation may be slower and lower performance may result";

NOTE 2 Item l) only on an inflatable PFD.

m) a warning that states: "Check the lifejacket before each use";

n) where the lifejacket has not been marked with the date of this document, it shall either be provided in the information leaflet supplied by the manufacturer or other documentation provided with the product.

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8 Consumer information at point of sale

8.1 General

A plain text version (according to Figures 2 and 3) and/or a marking information (see Figure 4) shall be applied for consumer information.

8.2 Plain text version

The information shall be clearly visible and legible when the device is presented ready for sale, either by ensuring visibility of a marking on the lifejacket itself or by additional labelling on the packaging.

If the presentation of information is divided in various sections, they shall be given in such a way that the consumer can perceive all sections together ("Survey on the entire lifejacket-system"). The layout of the labels given in Figures 2 and 3 is recommended, whereas the content is mandatory.

If the plain text version is chosen, the information shall be laid out in accordance with Figure 2. The minimum dimension of the information shall be 75 mm × 75 mm. Colours for the text and the label may vary, but shall always contrast with the background.

NOTE 1 Information in row (8) can be given by plain text data or by representing the supplier's logo.

NOTE 2 The label shown in Figure 2 can form the left side of a complete label (see Figure 3) presenting all stipulated data from the data list (see 8.3).

The layout of the right part of the label in Figure 3 is optional. For the contents, see 8.3. The entries in the table are examples.

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PERSONAL FLOTATION DEVICE	ISO 12402 -2 to ISO 12402-6		
Application	Performance level		(2)
Offshore, extreme conditions, special protective clothing, heavy equipment	lifejackets	275	(3)
Offshore, heavy weather clothing		150	(4)
Sheltered waters, light clothing		100	(5)
Swimmers only, sheltered waters, help at hand, limited protection against drawing, not a lifejacket	buoyancy aids	50	(6)
Special application device	all performance levels		(7)
Manufactured by: ..... , ... :			(8)
WARNING: FLOTATION DEVICES ONLY REDUCE THE RISK OF DROWNING THEY DO NOT GUARANTEE RESCUE			(9)

Figure 2 — Label specification

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PERSONAL FLOTATION DEVICE		ISO 12402-2 to ISO 12402-6
Application		Performance level
Offshore, extreme conditions, special protective clothing, heavy equipment	lifejackets	275
Offshore, heavy weather clothing	lifejackets	150
Sheltered waters, light clothing	lifejackets	100
Swimmers only, sheltered waters, help at hand, limited protection against drowning, not a lifejacket	buoyancy aids	50
Special application device		all performance levels
Manufactured by: ...., ...		
WARNING: FLOTATION DEVICES ONLY REDUCE THE RISK OF DROWNING THEY DO NOT GUARANTEE RESCUE		

SPECIAL FAEATURES			Integrated emergency position–indicating light and spray hood					
SPECIAL APPLICATION			Use in extreme climate conditions (–50 °C)					
OPERATION MODE			DESIGN					
Auto-matically operating	Manually operated	Oral inflation	Multi-chamber system	Amount of inflatable buoyancy (N)	Amount of inherent buoyancy (N)	Integrated harness	Use with harness	
							yes	no
✓					110		✓	

Size	Chest (cm)	Body mass (kg)	Buoyancy for specified body mass (N)	
			Actual value	Nominal value
Medium		70	110	100

Figure 3 — Example of a PFD label with additional information for its selection

8.3 Data list

If the layout of the recommended label is not used, the following details, including all variable data, shall be given in such a way as to inform the consumer coherently about the performance and the size of the lifejacket.

a) generic terms;

b) statement of the relevant standard and performance level;

c) any special features;

NOTE 1 Special features are given if the lifejacket offers more than the equipment and performance required by the standard, e.g. integrated spray hood, special emergency equipment.

d) any special application;

NOTE 2 Description of special applications, e.g. applicable for sports in white water or fire-fighter tactics or performance under extreme climatic conditions, etc.

e) whether the buoyancy is provided by

— inherent buoyant material,

— gas or air,

— inherent buoyant material and gas or air;

f) whether the lifejacket is

— fully automatically operating,

— manually operated;

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g) amount of buoyancy

— in total,

— as parts of inherent and inflatable buoyancy;

h) whether a safety harness

— is integrated in the lifejacket,

— can be worn on the body with the flotation device above;

i) size of the lifejacket

— by ticking in the relevant size of a size table,

— by giving the relevant body dimension of the person concerned (body height, chest circumference or body mass or an adequate combination of them), see right side of the label in Figure 3.

NOTE 3 All data shown as contents of the list can be given as shown in Figure 3 or by another format and layout.

If the recommended label as shown in Figure 3 is applied, the presence of data shall be marked and, where relevant, their quantity given by inserting the appropriate figures.

8.4 Marking information

The section 'Application', rows (2) to (6) of Figure 2 may be replaced by the relevant marking information shown in Figure 4. The minimum dimensions of this marking information shall be 50 mm × 50 mm. The remaining contents of rows (1) and (7) to (9) of Figure 2 shall be presented in accordance with 8.3.

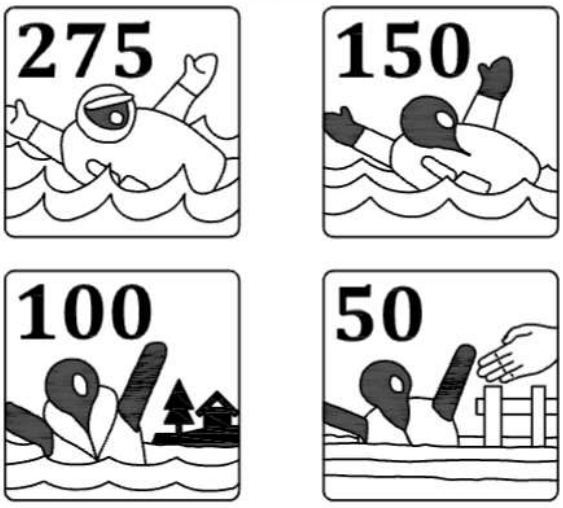

Figure 4 — Marking information

8.5 Colour-code

The background coloration of rows (3), (4), (5) and (6) of the label specified in Figure 2 and the marking information are optional. If a colour-code is used the following colours shall be applied:

a) blue for row (3) on the label and for the marking information '275';

b) turquoise for row (4) on the label and for the marking information '150';

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c) light brown for row (5) on the label and for the marking information '100';

d) pink for row (6) on the label and for the marking information '50'.

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Bibliography

[1] ISO 12401:2009, *Small craft — Deck safety harness and safety line — Safety requirements and test methods*

[2] ISO 12402-2:2020, *Personal flotation devices — Part 2: Lifejackets, performance level 275 — Safety requirements*

[3] ISO 12402-3:2020, *Personal flotation devices — Part 3: Lifejackets, performance level 150 — Safety requirements*

[4] ISO 12402-10:2020, *Personal flotation devices — Part 10: Selection and application of personal flotation devices and other relevant devices*

[5] International Maritime Organization (IMO) *International Convention for the Safety of Life at Sea (SOLAS)*, 1974, as amended

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